

## Claims:

1. An emitter comprising:  
an electron supply layer;  
an oxide layer on said electron supply layer defining an emission area;  
and  
5 an emission layer in the emission area and in contact with said electron supply layer, said emission layer being formed by a rapid thermal process and selected from a group comprising  $\text{SiO}_2$ ,  $\text{SiO}_x\text{N}_y$  and combinations thereof.
- 10 2. The emitter according to claim 1, wherein said emission layer is in the approximate range of 50-150Å.
- 15 3. The emitter according to claim 2, wherein said emission layer comprises an approximate 20Å  $\text{SiO}_2$  layer and a  $\text{SiO}_x\text{N}_y$  layer in the approximate range of 30 – 130 Å.
4. The emitter according to claim 1, wherein said emission layer comprises an approximate 20Å  $\text{SiO}_2$  layer and a  $\text{SiO}_x\text{N}_y$  layer in the approximate range of 30 – 130 Å.
- 20 5. The emitter according to claim 1, wherein the emitter includes means for creating an electrical field to stimulate tunneling.
- 25 6. The emitter according to claim 5, wherein the means for creating comprises a metal contact structure and a thin metal layer disposed over said metal contact structure and said emission layer.
7. The emitter according to claim 6, wherein said thin metal layer is selected from a group comprising Pt, Au, Ta and combinations thereof.

8. The emitter according to claim 7, wherein said thin metal layer is approximately 50 - 100Å.

5 9. The emitter according to claim 6, wherein said metal contact structure is part of a circuit interconnect metal structure in an integrated circuit including other devices.

10 10. The emitter according to claim 5, wherein the emitter is disposed relative to a memory medium to direct emissions toward the memory medium and thereby cause an effect in said memory medium.

15 11. The emitter according to claim 5, wherein the emitter is disposed relative to a display medium to direct emissions toward said display medium and thereby cause an effect in said display medium.

20 12. The emitter according to claim 5, wherein said electron supply layer comprises a silicon or polysilicon substrate and the emitter is disposed on said silicon or polysilicon substrate with emitter control circuitry to control the emitter.

25 13. A method for forming an emitter, comprising the steps of:  
forming a patterned oxide layer to define an emission area upon an electron supply layer; and  
with a rapid thermal formation process, forming an emission layer, within  
said emission area, of a material selected from a group of materials comprising  
SiO<sub>2</sub>, SiO<sub>x</sub>N<sub>y</sub> and combinations thereof.

30 14. The method of claim 13, further comprising a step of forming a metal contact structure on the patterned oxide layer.

15. The method of claim 14, further comprising a step of forming a thin metal layer on the emission layer and the metal contact structure.

16. The method of claim 14, wherein the metal contact structure comprises a single metal layer.

17. The method of claim 14, wherein the metal contact structure  
5 comprises multiple metal layers.

18. The method of claim 13, wherein said step of forming an emission layer comprises forming an approximate 20Å SiO<sub>2</sub> layer and a SiO<sub>x</sub>N<sub>y</sub> layer in the approximate range of 30 – 130 Å.  
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19. The method of claim 13, performed as part of an integrated circuit formation process to form the emitter as part of an integrated circuit including emitter control circuitry.

20. An integrated emitter circuit comprising:  
15 a silicon or polysilicon substrate;  
an oxide layer on said silicon or polysilicon substrate defining an emission area;  
an electron emission layer in the emission area and in contact with said  
20 silicon or polysilicon substrate, said electron emission layer being formed by a rapid thermal process and selected from a group comprising SiO<sub>2</sub>, SiO<sub>x</sub>N<sub>y</sub> and combinations thereof;  
a circuit interconnect electrical contact structure on said oxide layer; and  
a thin metal layer on said electron emission layer and said electrical  
25 contact structure.

21. The device of claim 20, wherein said electron emission layer comprises an approximate 20Å SiO<sub>2</sub> layer and a SiO<sub>x</sub>N<sub>y</sub> layer in the approximate range of 30 – 130 Å.  
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22. The device of claim 21, wherein said thin metal layer is selected from a group comprising Pt, Au, Ta and combinations thereof.

23. The device of claim 20, wherein said thin metal layer is selected from a group comprising Pt, Au, Ta and combinations thereof.

5           24. The device of claim 20, wherein said electrical contact structure comprises part of a circuit interconnect pattern connecting the device to other devices in an integrated circuit.

10           25. The device of claim 20 formed as part of an integrated circuit in a memory device, the memory device using electron emissions from the electron emitter to cause an effect in a memory medium disposed opposite the emitter.

26. The device of claim 20, formed as part of a memory device, the memory device including a plurality of the emitters and comprising :

15           a lens for focusing an electron beam from the emitter to created a focused beam; and

20           a memory medium in close proximity to the plurality of emitters, the memory medium having a storage area being in one of a plurality of states to represent information stored in the storage area, the states being responsive to the focused beam such that

          an effect is generated in the storage area when the focused beam impinges upon the storage area;

          a magnitude of the effect depends upon the state of the storage area; and

25           information in the storage area is read by measuring the magnitude of the effect.

27. The device of claim 26, further comprising:

30           a mover to position said memory medium with respect to the plurality of emitters; and

          a reader circuit integrated in said mover.

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a lens for focusing an electron beam from the emitter; and

a display medium in close proximity to the emitter, the display medium producing a visible emission in response to the focused beam.